SAINTS PERSPECTIVES
Things Biographical

The Hibernia Project

https://www.offshore-technology.com/projects/hibernia-oil-gas-field-project/

An account of the participation of
Saints Alumnus, Neville Jordan
in this Major Civil Engineering Project

Account Included in a report dated March, 2021

Neville Jordan at Saints

a) The **Class List** of the 1958 Saints Magazine shows that Neville Jordan was in Form 6A along with Alumnus John Yip. There were 15 students in that class.

b) The **News of Old Boys** section of the 1963 Saints Magazine reports the following:
Neville Arthur Jordan
B.Sc., Civil Engineering at the University of Aberdeen, Scotland.
He is continuing his studies at the same University.

Neville Jordan - Aberdeen, Scotland.

I live here. The climate in northern Scotland is not very agreeable, at least not to a tropical fish like me. In latitude, Aberdeen lies some 100 miles north of Moscow!!! In contrast, NY, Montreal, Toronto are of roughly similar latitude to Madrid. By the way, did you know that Aberdeen (pop c 250,000) is twinned with Georgetown?

In Aberdeen, there is a distinct lack of vitamin D-producing-sunshine for much of the year. Winters can be severe; as an example, years ago I lived in an apartment where -- one night in Nov. '85 -- the temperature dropped to **-15 deg. C** in my bedroom. Not only did the water pipes freeze and burst, but I ended up catching double pneumonia!
However, that's a story for another day...

In 1992, I accepted an offer of a temporary job in Paris, with a promised duration of "about 6 months". For a civil engineer like me, the task was an exciting one: to carry out preliminary design of Hibernia GBS (gravity base structure) —— the supporting structure of the world's largest offshore oil platform —— to be located in the Canadian Grand Banks.

In the beginning, the partnering companies thought the cost of the platform too high, relative to the income expected from Hibernia oilfield. This made the project's very future uncertain;

hence, the preliminary design phase likely to be short. I made the decision to commute from home (Aberdeen) to work (Paris).

As time went on, however, the Canadian Gov't stepped in, taking a 51% share in the project, reasoning that, when the time came to build the GBS, unemployed Newfoundland fishermen could be retrained as construction workers, thereby saving a fortune in state benefits. Thus, Hibernia Platform was given the green light to proceed to completion. In Paris, my office became busier as work on the design of the GBS continued...to the extent that I commuted between Aberdeen and Paris for a total time of 2 years and 8 months!

My pattern of commuting to and from work: fly home [Paris > London > Aberdeen] every fortnight on a Friday afternoon, then do same in the reverse direction on Monday morning. The problem was that on my travelling weekend, I had 2 such trips within 3 days, each lasting approx. 7 ½ hours, door-to-door. Phew!

Within a short while, the stress caused by such frequent and lengthy travelling became all too evident. My previously perfect digestive system took the biggest hit. Soon I began to suffer from heartburn and indigestion which didn't go away, not even long after my commuting days were over.

Hibernia Platform is installed on the seabed of the Canadian Grand Banks of the N. Atlantic Ocean, some 300km east of the city of St. John's, and 10km from the sunken liner, Titanic. Site preparation for construction of the 550,000 tonne gravity base structure started in 1991.

Reference: https://youtu.be/x0DuSBb2PUw

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The completed Hibernia Platform (GBS + topsides) on location, in a water depth of 80m. Constructed from post-tensioned, pre-stressed, concrete, the GBS has a perimeter ice-wall comprised of 16 "teeth" designed to absorb the impact of an iceberg having a mass of a million tonnes

Details of this Engineering Feat

Hibernia Oil and Gas Field Project, Newfoundland, Canada

https://www.offshore-technology.com/projects/hibernia-oil-gas-field-project/

Hibernia is located in the Jeanne d'Arc Basin, 315km east of St John's, Newfoundland and Labrador, Canada, in a water depth of 80m. The field consists principally of two early Cretaceous reservoirs, Hibernia and Avalon, located at average depths of 3,700m and 2,400m respectively.

Hibernia oil is a light sweet crude with a density of 32°-34° API and a sulphur content by weight of 0.4% to 0.6%. The field contains approximately three billion barrels of oil-in-place and recoverable reserves are estimated to be at approximately 1,200 million barrels.

The Hibernia field was first discovered in 1979. Development began in 1986 and construction started in 1991. The field started production in November 1997 and by 2009 its total crude oil production was 126,000 barrels per day (bpd). The field generated 667 million barrels by the end of 2009.

The Hibernia field is operated by ExxonMobil and owned by Norsk Hydro (5%), Murphy Oil (6.5%), Canada Hibernia Holding Corporation (8.5%), Suncor (20%), Equinor Canada (5%), Chevron Canada Resources (26.875%) and ExxonMobil Canada subsidiary (33.125%).

In February 2010, the developers signed an agreement with the Government of Newfoundland and Labrador for the Hibernia Southern Extension project. The agreement granted a 10% stake to the Canadian Government through its Nalcor Energy.

Production from the Hibernia field was briefly halted in August 2019 following a second oil spill in a month. It was resumed in October 2019.

Development of Hibernia

It was decided that the Hibernia field would be developed using a special gravity-based structure strong enough to withstand a collision with a one-million-tonne iceberg (expected to occur once every 500 years) and a direct hit from a six-million-tonne iceberg (expected just once every 10,000 years).

About 50 development wells were successfully drilled in Hibernia by January 2007. By that time, the total investment in the development was $5.8bn.

The field partners for the Hibernia Southern Extension at the time comprised ExxonMobil Canada (27.9%), Chevron Canada (23.7%), Suncor (19.2%), Statoil (9.3%), Nalcor Energy (10%), Canada Hibernia Holding (5.6%) and Murphy Oil (4.3%). The Hibernia Southern Extension is developed with tiebacks to the Hibernia platform and included up to five platform drilled production wells and up to six water injection subsea wells. First oil from the Hibernia South Extension Unit KK well was achieved in June 2011.

Gravity-base Structure of Hibernia field

Hibernia's novel 450,000t gravity-base structure (GBS) design consists of a 105.5m concrete caisson, constructed using high-strength concrete reinforced with steel rods and pre-stressed tendons. The caisson is surrounded by an ice wall, which consists of 16 concrete teeth.

Structurally, the 1.4m-thick ice wall is supported by a system of X and V walls, which transmit the loads to the interior tie wall. The X and V walls have a thickness, varying from 0.7m to 0.9m and the tie wall has a thickness of 0.9m. The walls form the ice belt.

The caisson is closed at the bottom and top by horizontal slabs and the base slab has a diameter of 108m. The upper top-surface slab is approximately 5m above sea level.

Storage tanks for 1.3 million barrels of crude oil relocated inside the gravity structure. Four shafts run through the GBS from the base slab to support the topsides facilities, including the utility, riser and two drill shafts. Each shaft is 17m in diameter and extends to a total height of 111m.

The utility shaft features the mechanical outfitting required to operate the GBS system. It includes pipework, heating, air-conditioning and electrical controls.

The two drill shafts each have 32 drill slots to accommodate the wells, which will reach depths of more than 3,700m below sea level, down into the oil reservoirs.

Topsides

The topsides have a design capacity of 23,900m³ per day (150,000bpd), based on the 98 million cubic metres (615 million barrels) estimate. The topside facilities consist of five super-modules (processing, wellhead, mud, utilities and accommodation for 185 people), as well as seven topside-mounted structures (helideck, flare boom, pipe rack, main and auxiliary lifeboat stations and two drilling modules).

The wellhead module for Hibernia was fabricated at Bull Arm while the remaining components were made in construction sites located around the world, including two in Italy and the remaining two in South Korea. Four of the topside mounted structures (flare boom, helideck, main and auxiliary lifeboat stations) were also fabricated at Bull Arm.

The other three topside-mounted structures (components of the two drilling rigs and the pipe rack) were fabricated in Newfoundland and New Brunswick, with some of the components being built in Alberta.

Mating

The 37,000t integrated topsides facility was transported by barges to the Hibernia deepwater site and positioned above the partially submerged GBS shafts to form the completed 600,000t production platform. It was then towed to its final site and 450,000t of solid ballast was added to secure it in place.

Offshore loading system

Oil stored in the GBS is exported by means of an offshore loading system (OLS) consisting of subsea pipelines, a subsurface buoy and flexible loading hoses, feeding a purpose-built shuttle tanker.

The other infrastructure supporting the field production include platform support facilities, shore base facility, Asco Warehouse Complex warehouse facility, transhipment terminal and a remotely operated vehicle.

Contractors in Hibernia oil and gas field project

In April 2011, FMC Technologies was awarded the contract to supply subsea equipment for the Hibernia Southern Extension project. Deliveries are scheduled to commence in the third quarter of 2013.

In May 2011, Technip won the contract to design, manufacture and install a flexible flowline and steel tub umbilical for the Hibernia Southern Extension project.

In September 1990, HMDC awarded the gravity-base structure (GBS) contract design to Newfoundland Offshore Development Constructors (Nodeco). The detailed design was subcontracted to Doris Development Canada (DDC).

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